

EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS ON CUMBERLAND GAP NATIONAL HISTORICAL PARK

By

J. H. Thompson

INTRODUCTION

Cumberland Gap National Historical Park is a 20,000-acre unit located in three states - Kentucky, Virginia, and Tennessee. It is administered by the National Park Service, U. S. Department of the Interior. The Cumberland Gap is a deep notch cut through the Allegheny Mountains providing a natural passage into Kentucky. The area has a rich history beginning in 1775 with the hewing of the Wilderness Road through the Gap by a party of axmen under the leadership of Daniel Boone.

Park personnel first noticed the current southern pine beetle infestation in the spring of 1975. The infestation is part of a southwide outbreak of the pest that now involves 13 states and has been moving steadily northward in the Appalachian Mountains. The infestation is likely to continue in the Park for several years. Of the 20,219 acres in the Park, approximately one-fourth is pine or pine-hardwood type and thus subject to infestation.

This evaluation was conducted to determine the current biological status of the pest and to appraise its probable trend.

METHODS

A 100 percent aerial sketchmap survey of the Park was made on August 8, 1975. The data were corrected for observer error according to Aldrich et. al. (1958). Representative spots were ground checked on October 7 to confirm the identity of the causal agent and to determine the general condition of the beetle population.

TECHNICAL INFORMATION

Insect - Southern pine beetle, *Dendroctonus frontalis* Zimm.

Hosts - Southern pine beetle is a native forest pest that will attack all species of southern yellow pine and occasionally other conifer species. The most prevalent and most severely affected species in the Park are Virginia pine, *Pinus virginiana* Mill. and pitch pine, *P. rigida* Mill.

Type of Damage - Death of the tree is the result of mining in the cambium as the southern pine beetle constructs its egg galleries. The beetle also introduces blue stain fungi, *Ceratozystis* spp., which slow or block water conduction in the xylem tissues.

Life Cycle of the Beetle - The beetles attack in pairs and construct a winding gallery in the cambium. Eggs are deposited in niches along the sides of the galleries. The eggs hatch into whitish grubs that further mine the cambium and then construct cells in the bark where they pupate or change to adults. The new adults then mine through the bark to emerge. The complete life cycle takes about a month during the summer, and as many as four or five generations may be produced annually in this area.

RESULTS AND DISCUSSION

Aerial survey results are summarized in Table 1. The southern pine beetle population has expanded rapidly during the short period of infestation as indicated by the number of spots (30) and their relatively large size. The ground checks disclosed large numbers of green infested trees, which are not detectable from the air. The ratio of green infested to red and fading trees is about 1:2. Thus, the total number of affected trees is about 6,000.

Table 1. Summary of results of aerial survey for southern pine beetle on Cumberland Gap National Historical Park, 1975.

| | |
|---|-----------|
| Survey type - - - - - | Sketchmap |
| Date of survey - - - - - | 8/28/75 |
| Total susceptible host type (acres) - - - - - | 5,000 |
| Total number of spots in Park - - - - - | 30 |
| Average spot size (red and fading trees)- - - - - | 132 |
| Range of spot sizes (red and fading trees)- - - - - | 8-1,000 |
| Total number of red and fading trees- - - - - | 3,952 |

The infestation is located mostly in the western half of the Park (Fig. 1). Some spots are in remote areas; others are adjacent to high use areas where they affect aesthetic values and create the potential hazard of standing dead trees.

Southern pine beetle activity is likely to continue at a high level in 1976. The desirability of applying suppression action is a decision for the managers of the Park. Many factors enter into such a decision--chief among which are Park and Agency management philosophy and objectives. It is unlikely that the beetle population could be entirely controlled even by intensive suppression efforts. However, individual spot infestations can be controlled. This approach should be considered for spots where visitor safety might be threatened, aesthetic values lowered, or fire hazard increased.

Where direct suppression is desirable, three methods are recommended by the U. S. Forest Service:

1. Removal of infested trees by commercial sale or by contract to eliminate an infested spot. From the combined economic and environmental aspects, commercial sale is usually the best suppression method where feasible. Trees with nearly developed beetle broods should be removed first.
2. Piling and burning of infested trees. This involves cutting trees and thoroughly burning the infested bark.
3. Cutting and spraying infested trees with a 1/2-percent solution of Lindane. This insecticide is registered for this use, but it is currently on the restricted use list of the National Park Service.

Advice and assistance concerning the use of any of these methods are available from the U. S. Forest Service, Forest Resource Protection Office in Asheville, N.C.

REFERENCE CITED

Aldrich, R. C., R. C. Heller and W. F. Bailey. 1958. Observation limits for aerial sketchmapping southern pine beetles in the southern Appalachians. J. For. 56 (3): 200-202.

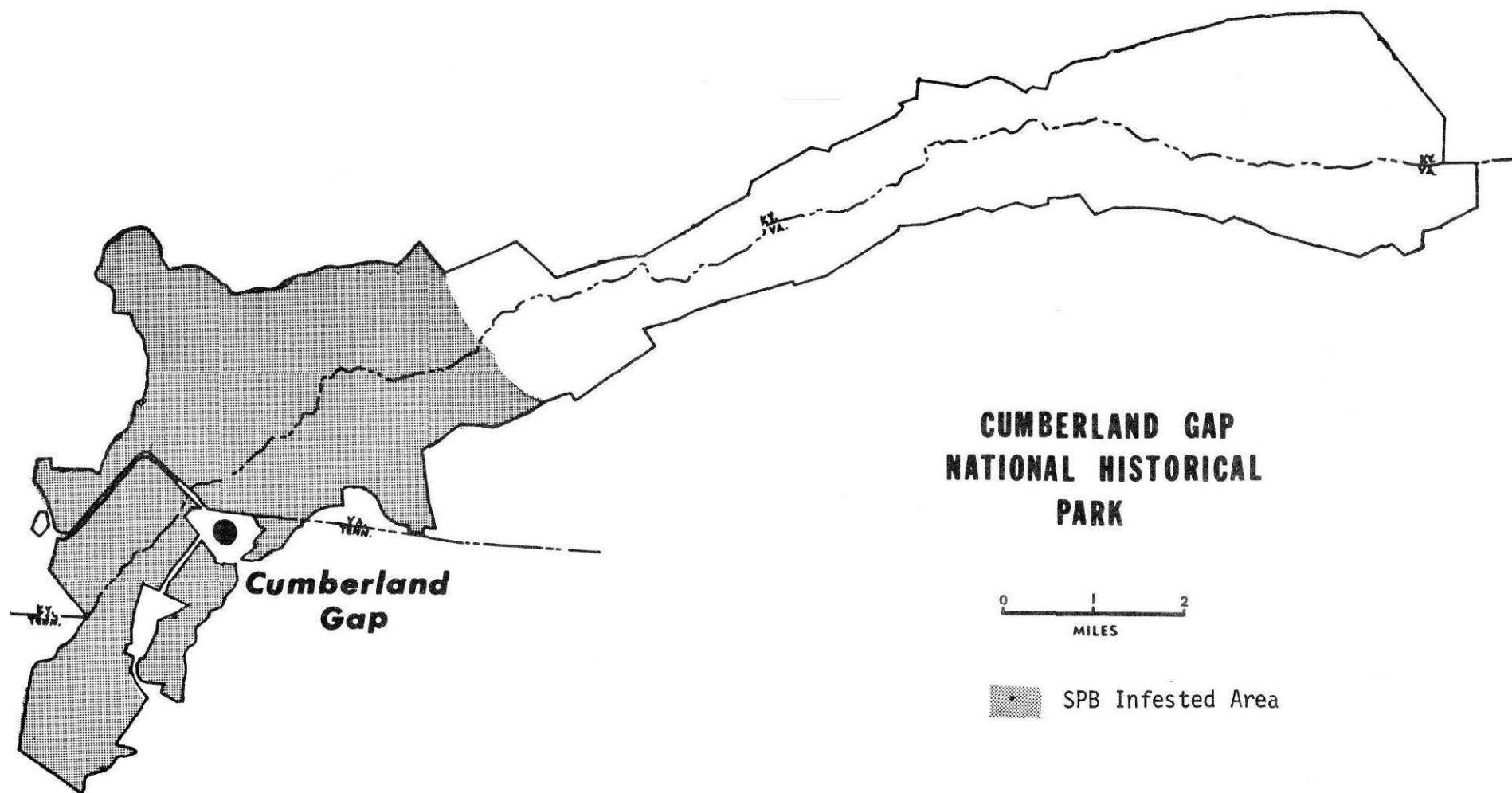


Figure 1. Southern pine beetle infestation on Cumberland Gap National Historical Park, August 1975.